EA-1183; Environmental Assessment Coal-Fired Diesel Generator University of Alaska, Fairbanks, Alaska

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National Environmental Policy Act (NEPA) Compliance

Proposed Action: To decide whether the U.S. Department of Energy (DOE) should provide funds to support the construction and operation of a coal-fired diesel generator. If approved, the DOE would provide, through a cooperative agreement with Arthur D. Little, Inc., partial funding for design, construction, and operation of a 6.3 megawatt-electric coal-fired diesel generator at the University of Alaska, Fairbanks.

Type of Statement: Environmental Assessment

Lead Agency: U.S. Department of Energy

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Abstract: The objective of the proposed project is to test the technical, environmental, and economic viability of a coal-fired diesel generator for producing electric power in small power generating markets. Coal for the diesel generator would be provided from existing supplies transported for use in the University's power plant. A cleanup system would be installed for limiting gaseous and particulate emissions. Electricity and steam produced by the diesel generator would be used to supply the needs of the University.

The proposed diesel generator and supporting facilities would occupy approximately 2 acres of land adjacent to existing coal- and oil-fired power plant and research laboratory buildings at the University of Alaska, Fairbanks.

The environmental analysis identified that the most notable changes to result from the proposed project would occur in the following areas: power plant configuration at the University of Alaska, Fairbanks; air emissions, water use and discharge, and the quantity of solid waste for disposal; noise levels at the power plant site; and transportation of coal to the power plant. No substantive adverse impacts or environmental concerns were identified in analyzing the effects of

these changes.

1.0 INTRODUCTION

This Environmental Assessment (EA) provides the results of a study on the potential environmental impacts from the proposed construction and operation of a Clean Coal Technology demonstration project at the University of Alaska, Fairbanks. The proposed project would consist of a coal-fired diesel generator with pollution control and ancillary equipment and a coal cleaning facility. The proposed demonstration project would have a three-year duration.

The purpose of the EA is to determine if the proposed action could potentially cause significant impacts to the environment. If potentially significant environmental impacts are identified, and if they cannot be reduced to insignificance or avoided, then a more detailed Environmental Impact Statement must be prepared. If no significant environmental impacts are identified, a Finding of No Significant Impact would be prepared and made available to the public, along with the EA itself, before the proposed action proceeds.

This study was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code 4321 et seq.), the Council of Environmental Quality's Regulations [Title 40 Code of Federal Regulations (CFR) 1500 et seq.], and Department of Energy (DOE) Regulations (Title 10 CFR 1021).

2.0 PURPOSE AND NEED FOR AGENCY ACTION

2.1 DOE's Purpose

The Clean Coal Technology (CCT) Program is a technology demonstration program that was legislated by Congress to be funded jointly by the Federal government, through DOE, and industrial sector participants. The established goal of the CCT Program is to make available to the U.S. market a number of advanced, more efficient, and environmentally responsive coal utilization and environmental control technologies.

The Coal-Fired Diesel Generator project, which would be conducted at the University of Alaska, Fairbanks, was selected under a competitive solicitation of the CCT Program. DOE's purpose is to help fulfill the goals and objectives of Congressional intent by demonstrating the potential of durable, low emission, and economic technology for use in smaller-scale coal-fired power generation applications.

2.2 Project Purpose

Arthur D. Little, Inc. (ADL), and its team were the successful applicants who proposed demonstrating Coal-Fired Diesel Generator technology under the CCT program. The ADL team consists of the University of Alaska, Fairbanks (UAF), the Cooper-Bessemer Reciprocating Division of Cooper Energy Services, the Energy and Environmental Research Center of the University of North Dakota, Usibelli Coal Company, and CQ, Inc.

The demonstration would be conducted at the UAF, which has proposed to host the project. UAF operates a coal- and oil-fired power plant to generate electricity and steam for campus use.

Black Start

In order to start a power plant's boilers to produce the steam necessary to generate electricity, the ancillary equipment, i.e., cooling water pumps, ash system, automatic stokers, fans, soot blowers, etc., necessary to run the boilers must all be operating. If no electricity is being generated, then an outside source must be used to start the plant's ancillary equipment before the boilers can be fired off. The power must come from another utility or from an emergency generator capable of handling the power plant's ancillary equipment load. Once the power plant is operational, it would be self sufficient, using its own power output to run all the ancillary equipment.

The UAF needs additional generating capacity to provide "black start capability" and to become self-sufficient during peak demands for power. Black start capability is the ability to restart the power plant in the event of a total blackout (see box).

2.3 DOE Need for Action

The Coal-Fired Diesel Generator project would fill an important DOE need under the CCT program by providing a low emission, economical technology for use in non-utility U.S. markets requiring less that 100 megawatts of power.

2.4 DOE Decision

The decision to be made by DOE is whether to provide cost-shared support for demonstrating coal-fired diesel technology at the University of Alaska, Fairbanks, based on the potential consequences evaluated in this Environmental Assessment.

2.5 Scoping

Scoping activities included: site visits to the University of Alaska, Fairbanks; technical meetings or telephone conversations with personnel from the University, ADL, ADL's project team, and municipal offices in Fairbanks; consultation with regulatory officials; and DOE review of environmental information provided by Arthur D. Little for the Coal-Fired Diesel Generator project.

2.6 Scope of the Environmental Assessment

The scope of the Environmental Assessment was determined after reviewing the proposed technology, the extent of testing that would be performed at the demonstration facility, the changes that would be required at the University of Alaska, the proposed setting for the project, and all available environmental information related to the proposed action.

The parameters examined included: air emissions, surface and ground water, wastewater, soil, noise, health and safety, transportation, solid and hazardous wastes, resource use, and environmentally sensitive resources. The key issues for the proposed action are: air emissions, waste management, noise, and health and safety.

3.0 DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 Background

The UAF is located just north of the City of Fairbanks, Alaska (see Figure 1). The University owns and operates a power plant, which is situated on the University's property, in the southeast corner of the campus (see Figure 2).

The UAF's power plant is a co-generation facility, which achieves a more efficient use of energy than a normal power generating facility. A co-generation facility uses some of the waste heat from the power generation, in the form of steam, to operate another system that would otherwise require its own separate boiler system, such as a building's heating plant.

The UAF's power plant has four boilers. Two Erie City boilers, #1 and #2, are automatic stoker-fed coal-fired units, each capable of producing 50,000 pounds per hour of steam. These boilers together consume approximately 164 tons per day of coal from the Usibelli mine in Healy, Alaska. The mine is located 80 miles south of the City of Fairbanks. Coal is transported by truck to the campus. The other two boilers, #3 and #4, are Erie City Keystone oil-fired boilers fueled by a mixture of number 4 and number 1 oil. Each boiler is capable of producing 100,000 pounds per hour of steam. The two oil-fired boilers consume approximately 1,042 gallons per day (gpd) of the fuel oil mixture. Oil is transported to the campus by truck and stored in a 200,000 gallon insulated and heated storage tank.

The power plant has three turbines. Two turbines, 1.5 megawatt (Mw) each, are not used, and one 10 Mw turbine is now in service. Steam from the four boilers is piped to the one turbine in service. The steam turns the turbine, which runs a generator to produce electricity. The steam loses heat and pressure in the process. A portion of this lower pressure steam (20 pounds per square inch) is diverted to the campus to heat the UAF=s buildings. The remaining steam flows to two air-cooled condensers to be returned to its water state, i.e., condensate. The condensate returns to the boilers for reheating. The coal-fired boiler emissions are sent through a baghouse where particulates (i.e., soot, unburned coal dust, and fly ash) are removed.

The UAF uses power and steam from its power plant to operate and heat the campus buildings, sells power and steam to U.S. Geological Survey and Department of Forestry offices, and sells steam to the local school district. The steam is transported to the campus and the UAF's customers through underground utility corridors (utilidors) that are approximately 4 feet (ft) wide and 6 ft high. The UAF has an agreement with the Golden Valley Electric Association, a rural electric cooperative, for a black start connection to supply the necessary electricity to restart the UAF power plant as needed. Currently, the UAF pays a minimum monthly fee for this connection whether it is used or not. The agreement terminates in 1999.

Figure 2: University of Alaska, Fairbanks

3.2 Description of the Proposed Action

The DOE proposes to provide financial assistance to ADL and its team to demonstrate coal-fueled diesel technology. The proposed demonstration project would be performed over a three-year period and would involve addition of a coal-fired diesel generator with pollution control and ancillary equipment, a coal cleaning facility, and a coal-water fuel (CWF) preparation system, including two storage tanks, to the UAF campus (see Figure 3).

A coal-fired diesel generator is a diesel engine combined with a generator. The diesel generator would be specially designed to operate on a fuel mixture of 50% coal and 50% water, instead of only conventional diesel fuel oil. The proposed coal-fired diesel generator would be a small power generating unit with a 20-cylinder coal-fueled Cooper-Bessemer diesel engine that burns approximately 2 tons per hour of cleaned coal, a generator, and auxiliary systems (see Figure 4). The coal-fired diesel generator would produce a maximum of 6.3 Mw of electricity. This diesel generator would provide the UAF with black start capability, and the additional 6.3 Mw of generating capacity would allow the UAF to remain self-sufficient in meeting the anticipated peak load demands for power.

In order to produce the necessary fuel for the diesel generator, a coal cleaning facility and CWF preparation system would be required. The coal cleaning facility and CWF system would consist of a ball mill, a cyclone separator, heat exchanger, thermal oxidizer, feed tanks, ancillary equipment, and two product storage tanks.

Along with installing the 6.3 Mw diesel generator and the coal cleaning facility and CWF system:

Coal-Water Fuel

The fuels for the converted oil-fired boiler and for the diesel generator are both technically coal-water fuels. However, to assist the EA reader, the fuel for the converted oil-fired boiler will be referred to as coal-water fuel, and the fuel for the diesel generator will be referred to as diesel slurry.

- One oil-fired boiler would be converted to CWF use and a baghouse would be installed for particulate control.
- The second oil fired boiler would be kept on Ahot standby@ for emergency use. Steam would be used to keep the unit "hot."
- One of the automatic stoker-fed coal units would be held at cold reserve, taking six to eight hours to start up in case of an emergency.
- The other stoker-fed coal unit would be used as it is currently.

The net result of these changes would be:

- The approximate effective output with the new coal-fired diesel generator, with the other improvements, would increase electric power generating capacity from 10 Mw to 16 Mw.
- The changes would reduce UAF's costs associated with purchasing higher cost fuel oil.

Upon completing the proposed demonstration, the coal processing and diesel generator facilities would be available for continued, long-term use by the UAF. If at that time the UAF warrants that it would be more advantageous to operate the diesel generator only in an oil mode, the coal-fired diesel generator could be converted to an oil-fired diesel generator.

3.3 Project Description

3.3.1 Construction Activities

The new diesel generator facility would be constructed on a concrete pad adjacent to the University's existing utility power plant building in one of two proposed sites (see Figure 3). Both proposed sites, A and B, are currently used for utility plant ancillary functions, such as equipment storage and/or parking. Each site would require less than 20% of the land area occupied by the existing utility plant.

The selected site would be excavated to 4 ft below the surface level to reach below the frost line. A concrete pad that occupies an area 50 ft by 25 ft would be poured. The diesel generator would be erected on the pad along with air pollutant control equipment, consisting of a cyclone separator to remove larger size ash particles, a selective catalytic reduction system using aqueous ammonia, i.e., ammonia in a water solution, for nitrogen oxides (NOx) [1] removal, a sorbent injection system using sodium bicarbonate for removing acid gases including sulfur oxides (SOx)[2], a baghouse for fine ash particle removal, and a new exhaust stack that would reach a maximum height of approximately 80 ft above the ground level of the proposed facility (see Figure 4). The total footprint for the diesel generator facility would be approximately 50 ft by 60 ft.

To retrofit the oil-fired boiler #3 to use CWF, components such as the burners, soot blowers, etc., would be replaced. If site A is selected for the proposed diesel generator, a second baghouse would be constructed for controlling particulate emissions from the CWF-fired boiler. If site B is selected for the proposed diesel generator, a common baghouse and stack would be constructed for use by the diesel generator and the CWF-fired boiler.

The proposed coal cleaning facility would be built inside the existing Mineral Industry Research Laboratory (MIRL) building, which is approximately 99 ft by 80 ft. The MIRL is separated from the utility plant by a parking lot and is located approximately 600 ft east of the power plant building (see Figure 3). The west end of the MIRL is presently used as a warehouse with a bay area of approximately 72 ft by 80 ft. The east end of the building has two stories of newly renovated office and laboratory space. The offices and laboratories occupy an area of approximately 27 ft by 80 ft.

The open bay warehouse area in the MIRL would be used for constructing the coal cleaning facility. No demolition work within the building would be necessary. The wares currently being stored in the building would be moved to another storage location. The coal cleaning and processing units would consist of a ball mill for coal size reduction; a cyclone for separating the higher ash coal from the engine grade lower ash coal; a heat exchanger for coal heat treatment; a thermal oxidizer to treat the off gases produced by the coal heat treatment process; and tanks to store the feed stocks and mix the CWF and diesel slurries.

Two types of coal fuel would be produced by the coal cleaning process: the diesel slurry and the CWF. These products would be stored in insulated and heated above-ground storage tanks: 60,000 gallons for the diesel slurry and 280,000 gallons for the CWF. The tanks would have earthen dikes constructed around them to protect the environment in the unlikely event of an accidental spill or leak.

The slurry would be transported to the storage tanks and from there to the CWF boiler or the diesel generator through 4-inch diameter piping that would be installed in the existing underground utilidors. All transmission lines necessary to connect the proposed project's generated power to the campus grid, and all power supply cables necessary for the operation of ancillary equipment, would be run through the existing utilidors.

Aqueous ammonia and sodium bicarbonate required for the air emission control system would be stored in a 5,000 gallon tank and standard solids storage hopper, respectively.

The schedule proposed for the project would be to complete facility design in late-1997 and to finish construction by mid-1999. A peak construction labor force of 32 persons would be required: 20 to build the coal diesel facility and 12 to build the coal cleaning/CWF facility.

3.3.2 Operation Activities

Operational requirements for the new facilities would be adequately provided by the existing infrastructure (i.e., water supply, wastewater treatment, roads, and electricity).

The only coal used for this proposed demonstration project would come from the Usibelli coal mine in Alaska. The Usibelli coal has an ash content of 8% to 10%. Preliminary specification based on earlier tests suggests that coal for use in a coal-fired diesel generator should have an ash content preferably between 2% and 5%. Therefore, to obtain the coal for the proposed project, part of the Usibelli mine's coal seam would be specially selected during mining to produce a coal containing the least amount of ash. The coal would be delivered by truck to the proposed coal cleaning facility in the converted MIRL building. The proposed facility would process up to five (5) tons of coal per hour to make diesel slurry for the diesel generator and CWF for the retrofitted boiler.

During operation of the proposed coal cleaning process, the coal would be ground in a ball mill. A ball mill is a continuous pulverizing machine, consisting of a rotating drum that contains metal balls as the grinding implements. The coal would then be mixed with water.

The coal-water mixture would be physically separated into two coal streams by a cyclone separator, which is a centrifugal funnel-shaped device that uses constant swirling motion to separate materials having different densities. A clean coal stream (2% to 7% ash content) would be produced for use as the diesel slurry. A middling stream (8% to 10% ash content) would be produced for use in making the CWF; it would be mixed with additional water and piped to its storage tank. A heavy media mixture of water and finely divided high-gravity solids, such as ferrosilicon and magnetite, would be used to facilitate the separation process in a recycle loop through the cyclone separator.

The clean coal stream from the cyclone separator would be sent to the heat treatment process. Usibelli coal naturally contains moisture. However, for the coal particles to burn properly in the diesel generator, they must contain negligible internal moisture. Therefore, the moisture within the coal must be removed from the ground coal particles. Once removed, the moisture must not be allowed to re-enter the coal particles. To remove moisture from within the coal particles, the coal would be heated under pressure in a process akin to using a pressure cooker. This process would drive the moisture from the coal particles and bring waxy type substances, inherent in the coal, to the surface of the particle. The waxy substances would seal the coal particles, preventing re-absorption of moisture when the coal is slurried. The entire heat treatment process would be performed under water, which would eliminate any possibility for fire or explosion.

The heat treatment process would produce volatile organic carbon off gases and a trace amount of hydrogen sulfide (H_2S), a gas that has a characteristic rotten egg odor. The off gases, containing approximately 95.5% carbon dioxide and trace amounts of propylene, butene, ethylene, ethane, methane, and carbon monoxide, would be sent to a thermal oxidizer, which is a pollution control unit that would use propane gas as the fuel to literally burn, i.e., oxidize, the organic gases and H_2S. The resulting emissions from the unit would be carbon dioxide, water, and SOx. Approximately 900,000 cubic feet per year of propane gas would be consumed for this purpose.

Moisture removed from coal during the heat treatment process and additional water would be used to slurry the coal. In order to burn coal in a diesel engine, the coal needs to be in a slurry, i.e., liquid form. During operation, the coal cleaning facility would be a net water consumer. The facility would use approximately 1.8 million gallons of water over the three-year demonstration period. During shut down of the coal cleaning facility at the end of a batch process or for maintenance, the system would be flushed, generating a maximum 3,000 gallons of wastewater. This would occur as often as once per week during the early period of operation, with decreasing frequency thereafter.

The diesel generator would be run on diesel slurry for up to 6,000 hours of intermittent operation over the three-year demonstration period from 1999 to 2001. The tests would be run to show the durability, low emissions, and commercial performance characteristics of the coal diesel generator. The diesel generator would be started using diesel oil. After the diesel generator is running, the fuel would be switched to a blend of diesel slurry (95%) and diesel oil (5%). The diesel oil would act as a continuous primer or pilot light to ignite the diesel slurry in the cylinder. In addition to operating in coal-fired mode, the diesel generator would be operated using only diesel oil as fuel, for up to 17,500 hours over the three-year demonstration period, to test, calibrate, and measure performance of the diesel generator and to produce power for UAF.

Operation of the pollution control devices for the proposed diesel generator over the three-year demonstration period would require approximately 180,000 pounds of 100% ammonia for NOx control and approximately 180,000 pounds of sodium bicarbonate sorbent for SOx control. The sorbent that reacts with the SOx would be recovered with the coal ash from the diesel generator's cyclone separator and the baghouse ash.

Over the three-year life of the proposed demonstration, approximately 41,200 tons of raw coal would be used to produce approximately 12,100 tons of clean, heat treated coal, i.e., the amount of coal before it is slurried. Coal and oil consumption at the UAF would decrease in the year with the highest diesel generator utilization (see Table 2). Oil consumption would drop further if the diesel generator were to continue to be operated on diesel slurry after the completion of the proposed demonstration project.

An estimated four coal cleaning/slurry preparation operations workers and one power plant worker would be required for the proposed project.

3.4 The No Action Alternative

Under the No Action Alternative, DOE would not authorize the financial assistance to ADL, and the proposed project facility would not be built as described in this EA. The existing UAF power plant would remain unchanged. However, the UAF is committed to establishing black start capability and providing additional power capability to meet the peak needs of the University; this commitment would most likely be met through the purchase, installation, and operation of an oil-fired diesel generator. Therefore, even if the DOE were to take Ano action,@ the situation at UAF would change.

3.5 Alternatives to the Proposed Action

The alternatives for this proposed project are:

- Two proposed sites for the diesel generator (Sites A and B on Figure 3)
- Two different coal heat treatment processes, and
- The continued use of the diesel generator either in a coal-fired mode or an oil-mode after the completion of the proposed demonstration project.

The reason for the two proposed sites for the diesel generator is economic. Proposed site A (see photographs in Appendix B), which is east of the power plant building, would require less fuel transport piping; however, the proposed site B to the west and south of the existing power plant is closer to boiler #3. Situating the proposed diesel generator at site B would allow use of the baghouse and stack constructed for the diesel generator by the CWF fired boiler #3. During the project schedule for facility design, the UAF would consider and use the comparative construction and operating costs of locating the diesel generator at each of the alternative sites as the basis for identifying a preferred location for the facility.

Since the two alternative sites are near each other and each site has the same type of affected environment, the impacts from the proposed project would be the same for either site. Therefore, the impacts discussed in this EA would apply to either site.

A second type of coal heat treatment process was considered. This more conventional process would not use a pressurized system to treat the coal and would, in effect, treat the coal in the open air. This process would effectively remove the internal moisture from the coal, but the pores of the particles would not seal. With the pores unsealed, water would reenter the particle when the coal is slurried and the resulting slurry could not be used effectively in a diesel generator. Therefore, this alternative was rejected.

If the demonstration project is successful after the three-year period and if coal fuel is cost-competitive with diesel fuel at that time, the diesel generator would continue to be used in a coal-fired mode. However, if at that time the use of a coal-fired diesel generator is not cost-competitive, the diesel generator could be converted to an oil-fired mode to provide the UAF with the black start capability and the additional power capacity it would need.

3.6 Comparison of Alternatives

Based on the evaluations contained in Section 4.0, Table 1 presents a comparative summary of the impacts of the alternatives.

4.0 AFFECTED ENVIRONMENT AND THE ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1 Approach

To analyze the potential impacts of the proposed action on the environment, a structured process involving the following activities was performed:

- Working with the UAF and ADL to identify the component activities involved in the proposed action;
- Identifying and analyzing all conceivable environmental effects that could be caused, directly or indirectly, by each of the proposed activities; and
- Starting with the potential direct effects, working through a series of questions for each effect:
- Could the effect actually occur? If not, why not?
- If an effect could occur:

How long would it last?

How often would it occur?

How far would the impacts extend?

How severe would the impacts be?

What would be the basis for saying so?

A cause-effect-question evaluation diagram (see Appendix A) was developed to map out the series of potential effects that could be caused, directly or indirectly, by the project activities. In many cases, a potential effect could be readily ruled out as not being reasonably foreseeable. In such cases, any subsequent environmental consequences would also be ruled out.

For some resources, no reasonably conceivable mechanism of effect could be identified. That is, for several resources, no mechanisms could be identified through which the proposed project could affect that resource. These resources include housing, economy, education, health care and human services, and police and fire protection services.

Section 4.0 of the Environmental Assessment is organized by resource. The relevant aspects of each applicable resource's existing condition are described followed by the potential consequences of the proposed action on that resource.

How far would the impacts extend?

How severe would the impacts be?

What would be the basis for saying so?

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Section 4.0 of the Environmental Assessment is organized by resource. The relevant aspects of each applicable resource's existing condition are described followed by the potential consequences of the proposed action on that resource.

Table 1 Comparison of the Impacts of Alternatives

Resource	No Action	Proposed Action	
		Construction	Operation
Air Quality	NOx and CO emissions increase from present levels	Construction dust, equipment emissions - no degradation of air quality	Emissions of SOx, PM_{10}, NOx, and CO decrease from present; Ammonia emissions within Air Quality Standard; H2S below odor or toxicity thresholds
Protected Species	No effects on any Federal or State protected species	No effects on any Federal or State protected species	No effects on any Federal or State protected species
Cultural Resources	No effect on archaeological site	No effect on archaeological site	No effect on archaeological site
Water Resources	Contamination from spills would be very unlikely	Contamination from spills would be very unlikely	Groundwater use increases by 25 gpm from 45% of UAF capacity to 51%
Wastewater	No increase from present discharge	Construction phase wastes hauled off-site	Occasional increased discharge of 3,000 gallons
Soil	No effect	No effect	No effect
Noise	Outdoor workers near power plant would be exposed to greater than 85 dBA	Construction noise within generally acceptable range for nearby receptors	Outdoor workers near power plant would be exposed to greater than 85 dBA

Socioeconomic Resources	No impact on community workforce, population, or infrastructure needs	No impact on community workforce, population, or infrastructure needs	No impact on community workforce, population, or infrastructure needs
Worker Health and Safety	Minimal effect on existing situation	Minimal effect on existing situation	Minimal effect on existing situation
Traffic and Transportation	Increase in oil delivery traffic	Small increase for workers, materials delivery, and construction vehicles	Decreased traffic from coal and oil delivery trucks
Solid and Hazardous Waste	Little or no increase in solid/hazardous wastes	Hazardous construction waste requiring off-site disposal	Less than 350 tons per year of solid waste requiring off- site disposal
Pollution Prevention	Increases air pollution	Best management practices would be used	Reduces air pollution; water recycling; selective coal recovery from mine to reduce combustion particulate emissions; fosters use of clean coal technology

4.2 Site Description

The proposed location for the demonstration project is bordered on the south and west by the Alaska Railroad corridor and a 40-50 acre patch of mixed forest. The proposed location is bordered on the north and east by developed portions of the campus. All campus sites proposed for use have been altered as a result of previous or on-going University development activities.

Specifically, the proposed project would use existing buildings, along with land that is currently used for utility plant ancillary functions or parking at the UAF. There are no environmentally sensitive resources at or near the site, except the Creamers Field Wildlife Management Area and Hiking Trails, a state bird sanctuary located approximately 2 miles northeast-east of the UAF.

There are no floodplains, wetlands, prime farmland, trails, or special sources of water (sole source aquifers) located at the proposed sites. Flora and fauna would not be affected by construction because the proposed project activities would occur in an already disturbed, actively used, non-vegetated area. There are no archaeological or historic resources located on the proposed project site. There have been no expressions of organizational interest or involvement by Native American groups, currently or in the past, regarding UAF power plant operations or past capacity additions.

The nearest campus student buildings are approximately 500 ft north of the power plant site. The nearest off-campus public use and private residence locations, respectively, are approximately 800 ft and 1,500 ft south of the proposed project site.

4.3 Air Quality/Meteorology

4.3.1 Affected Environment

The proposed project would be located in the Fairbanks Northstar Borough, which is part of the Northern Alaska Intrastate Air Quality Control Region (AQCR). Each AQCR, and its portions, is designated by the U.S. Environmental Protection Agency as being either in attainment, nonattainment, or unclassifiable when compared with the National Ambient Air Quality Standards (NAAQS) (see box). Fairbanks is designated as attainment or unclassifiable for each of the criteria pollutants, i.e., the six NAAQS pollutants, except carbon monoxide (CO).

There are no Class I areas within 62 miles of the site. A Class I area, where more stringent air quality regulations apply, is defined under the Clean Air Act (Title 42 United States Code Part 7472, Section 162) as an international park, national park that exceeds 6,000 acres in size, or a national wilderness or national memorial park that exceeds 5,000 acres in size. The Class I area that is closest to the proposed location of the coal-fired diesel generator is the Denali National Park Area, which is approximately 75 miles southwest of the UAF.

National Ambient Air Quality Standards

Primary Standards establish the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing a margin of safety to protect sensitive members of the population. The Secondary Standards establish the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impact on the environment.

Pollutant	Averaging Time	Standards$^{(1)}$
Ozone	1 hr	235 Fg/m$^{(3)}$
Carbon Monoxide	1 hr	40 mg/m$^{(3)}$
	8 hr	10 mg/m$^{(3)}$
Nitrogen Dioxide	Annual	100 Fg/m$^{(3)}$
Sulfur Oxides	Annual$^{(2)}$	80 Fg/m$^{(3)}$
	24 hr$^{(2)}$	365 Fg/m$^{(3)}$
	3 hr$^{(3)}$	1300 Fg/m$^{(3)}$
Suspended Particulate (PM_{10})	Annual	50 Fg/m$^{(3)}$
	24 hr	150 Fg/m$^{(3)}$
Lead	3 year	1.5 Fg/m$^{(3)}$

[1] Both the Primary and Secondary Standards are the same value, except for sulfur oxides.
[(2)] Primary Standard
[(3)] Secondary Standard

4.3.2 Environmental Consequences

Construction Impacts

Air quality impacts from the proposed construction would be short-term, low-level, intermittent, and transient emissions of NOx, PM_{10}, and CO routinely resulting from the coming and going of trucks, on-site machinery, and dust created by construction activities. Such emissions would not produce any degradation of ambient air quality. In addition, dust created by excavation activities would be controlled by conventional water spraying techniques.

Operation Impacts

The estimated annual air emissions for the proposed demonstration project as compared to the No Action Alternative are presented in Table 2. The comparison takes into account that, under the No Action Alternative, the UAF is committed to purchasing an oil-fired diesel generator. Therefore, the comparison on Table 2 is for the year when the coal-fired diesel generator would be in maximum operation, along with the CWF boiler and the stoker-fed unit, versus the No Action Alternative, which represents the current plant operation along with the addition of an oil-fired diesel generator. All of the estimated emissions would be within the UAF's State Air Quality Permit specifications.

Currently, air emissions from existing sources at the UAF are within the University's State Air Quality Permit specifications. The proposed project would not require a modification of the permit limitations. Only a modification to the equipment list in the permit would be required. The Alaska Department of Environmental Conservation (ADEC) issued to the UAF the required Air Quality Control Permit to Operate Modification on October 8, 1996. However, if the design throughput of the physical coal cleaning process exceeds 5 tons per hour, which is not planned under the proposed project, an additional operating permit from ADEC would be required.

Current emissions from the UAF power plant, emission estimates resulting from the proposed action and the No Action Alternative, and emission limits in the State Air Quality Permit for the UAF power plant are:

Pollutant	Current Emissions* (tpy**)	No Action Alternative Emissions (tpy)	Proposed Action Emissions (tpy)	State Permit Limit (tpy)
SO_2	275	208	137	1,232
NOx	401	419	218	710
PM_{10}	4.3	3.9	2.5	81
CO	139	152	83	504

- Estimated UAF power plant emissions (Reference (Ref.) 1)
- *tpy = tons per year

Under the proposed action, the estimated annual air emissions for each of the four criteria pollutants would be less than the current emissions. Sulfur dioxide (So_2) emissions from the power plant would decrease from the current level by approximately 138 tons per year; NOx would decrease by 183 tons; particulates would decrease by 1.8 tons; and CO would decrease by 56 tons. The reductions in emissions would be expected to improve air quality in the AQCR.

Coal processed by the pressurized heat treatment process would release gases, most notably H2S, which is of primary concern due to its offensive odor (rotten egg odor) and its toxicity at high concentrations. The concentration of H2S in the gases is estimated to be 500 parts per million (ppm) before thermal treatment (Ref. 2). However, the concentration would be reduced in the internal processing of the gases and liquids and would likely be lower than 500 ppm. The off gases from the heat treatment process would be treated in a propane gas-fed thermal oxidizer with a destruction efficiency of 99.99%. The concentration of H2S would be reduced to a maximum of 0.05 ppm. This concentration is well below the Permissible Exposure Limit threshold of 10 ppm (Ref. 3), which is the time-weighted average exposure level at or below which repeated exposures would not result in an adverse effect.

The threshold concentration for H2S odor detection is 0.0005 ppm (Ref. 4). Using the destruction efficiency of 99.99% in the thermal oxidizer and a conservative estimate of dispersion from the exhaust stack of 100 times at very close receptors, the ambient levels of H2S would be expected to be no higher than the detection threshold. If this expectation changes such that an odor problem becomes anticipated, the destruction efficiency of the thermal oxidizer would be increased as a mitigation measure (Ref. 5).

Alaska currently has an Ambient Air Quality Standard for ammonia of 2.1 milligrams per cubic meter, which equals approximately 3 ppm. The diesel generator would use aqueous ammonia injection for NOx control. The ammonia concentration in stack emissions would be less than 10 ppm. This ammonia concentration would be reduced to a level well below the Ambient Air Quality Standard after it has dispersed a distance of 10 feet from the point of emission(Ref. 6).

Ice fog forms when the moisture from natural or industrial emission sources freezes, thus suspending ice particles in the air. Most ice fog formations result from low-level sources of moisture, such as large ponds or lagoons. Theseformations can impair visibility at ground level and are safety concerns, especially for motorists. The moisture discharged from the coal diesel facility would occur in hot exhaust gas at the stack elevation of 80 ft. The maximum plume drop observed by UAF personnel for discharges from the existing power plant stack is approximately 10 feet (Ref. 7). Moisture in exhaust gas from the existing UAF power plant is discharged at a rate of approximately 8,000 pounds per hour (lbs/hr). The estimated rate of moisture discharge from the proposed project would be 10,300 lbs/hr. For comparison, natural gas combustion in a plant producing the same energy output as the proposed power plant would discharge moisture at a rate of 11,300 lbs/hr.

Table 2 Estimated(1) Annual Air Emissions for Project Alternatives(2)

Alternative	**Unit**	**Operating Hours**	**Fuel**	**Coal Use(3) (tons)**	**Oil Use (gallons)**	**So_2 (tons)**	**NOx (tons)**	**PM_{10} (tons)**	**CO (tons)**
No Action(4)	Stoker Boiler	8,400	Coal	30,000	-	93.1	204.6	1.7	74.7
	Stoker Boiler	8,400	Coal	30,000	-	93.1	204.6	1.7	74.7
	Oil Boiler	1,000	Oil Blend(5)	-	190,000	10.1	1.9	0.2	0.5
	Oil Boiler	1,000	Oil Blend	-	190,000	10.1	1.9	0.2	0.5
	Diesel(6) Engine	100	Oil Blend	-	30,000	1.4	6.2	0.1	1.6
Totals				60,000	410,000	207.8	419.2	3.9	152.0
Proposed Project	Stoker Boiler	8,400	Coal	11,000(7)	-	34.2	75.2	0.6	27.5
	CWF Boiler	5,000	CWF(8)	16,200	-	79.0	83.2	0.6	8.3
	Coal Diesel	4,000	Slurry with Diesel Oil	8,100	78,000	12.2	16.1	0.3	36.1
	Coal Diesel	500 (Oil Mode)	Oil Blend	-	196,000	9.9	43.4	1.0	11.3
	Thermal Oxidizer	7,200	Propane(9)	-	-	1.3	0.2	0.0(10)	0.0(11)
Totals				35,300	274,000	136.6	218.1	2.5	83.2
Difference in Annual Emissions Due to Proposed Project Versus No Action Alternative						-34%	-48%	-36%	-45%

(1) Estimates are for the proposed project year having the highest coal-diesel utilization.
(2) Source: Reference 1.

(3) Coal mass for stoker boilers is "as-fired" and the coal mass for CWF boiler is "dry," i.e., before being mixed with water.
(4) No Action Alternative assuming UAF purchases and installs a diesel generator for black start capability.
(5) The oil is a blend of number 1 and number 4 fuel oil.
(6) Diesel engine is assumed to be utilized for black start and peak power production.
(7) For the same 8,400 operating hours, boiler would produce less amount of steam and thus would require less coal.
(8) Coal Water Fuel.
(9) The thermal oxidizer would use approximately 900,000 cubic feet of propane gas per year.
(10) Estimated emission = 0.005 tons.
(11) Estimated emission = 0.025 tons.

4.4 Biodiversity and Environmentally Sensitive Resources

4.4.1 Affected Environment

The proposed project site is within the range of the American peregrine falcon (*Falco peregrinus*), which is Federally listed as endangered. No peregrine falcon nesting sites are known to exist within 15 miles of the proposed site; however the falcons may migrate through the area (Ref. 8). There are no State-protected species of plants or animals within or near the proposed project site (Ref. 9).

There is one State of Alaska environmentally sensitive resource, Creamers Field Wildlife Management Area and Hiking Trails, a state bird sanctuary that is located approximately 2 miles northeast-east of the UAF. There is an archaeological resource approximately 600 ft northeast of the of the proposed project site. The archaeological site was a hunting lookout and is one of the oldest sites of human habitation in North America. On-going exploration of the site has identified 7,000 to 10,000 year old artifacts (Ref. 10).

4.4.2 Environmental Consequences

Construction Impacts

At a distance of 2 miles from the proposed project site, the bird sanctuary would not be affected by construction-related noise, fugitive dust, or heavy equipment exhaust.

Construction of the proposed facilities would not adversely affect peregrine falcons or any other listed species. Consultation with the U.S. Fish and Wildlife Service confirms the validity of this conclusion (Ref. 8).

There are no known archaeological sites at the proposed project sites, and the construction activities would not disturb the archaeological site approximately 600 ft northeast of the proposed project. Consultation with the Alaska Office of History and Archaeology confirms the validity of this conclusion (Ref. 11).

Operation Impacts

Acid precipitation, which is caused by the combination of precursors (NOx and SOx) in the air with precipitation, could have an adverse impact on flora and fauna. At the UAF's present level of air emissions, there has been no evidence of an impact on the Creamers Field Wildlife Management Area and Hiking Trails. When the proposed project is operational, the acid precipitation precursors would be reduced, and thus the potential for acid precipitation would be reduced.

Operation of the proposed project would not adversely affect peregrine falcons or any other listed species, and the U.S. Fish and Wildlife Service concurs with this conclusion (Ref. 8).

Operation of the proposed project would have no impacts on the archaeological site located on the UAF campus; the Alaska Office of History and Archaeology concurs with this conclusion (Ref. 11).

4.5 Surface/Ground Water Quality/Spill Control Plans

4.5.1 Affected Environment

The UAF operates a series of wells to supply the campus with potable and process water. The well heads are located approximately 1,500 ft south of the proposed project site.

In the late 1980s, some wells at the UAF exhibited elevated levels of benzene and other organic contaminants. UAF established an extensive groundwater monitoring network and, based upon the collected data, developed and implemented remedial action plans. The monitoring data indicated that the contamination was probably from an off-campus source. Neither the power plant nor the MIRL were identified as contributors to the contamination. The most recent data indicate a decline or absence of contamination.

The potable water supply for the campus is aerated to remove potential contaminants, including benzene, thus rendering campus water supplies safe for human consumption.

The proposed project sites are located within the drainage area of the Deadman Slough, about 1,000 feet to the south of the site. Deadman Slough, with intervening forest, rail bed, and roadways, meets the Chena River. However, the proposed sites do not have any avenues of surface water flow that lead off the site. All stormwater from the power plant area drains toward a ditch along the north side embankment of the adjacent Alaska Railroad tracks. There are no drainage pathways for surface water runoff to exit the ditch through the embankment to any off-site location.

4.5.2 Environmental Consequences

Construction Impacts

Construction of the proposed facilities would not impact the current groundwater supply. The construction activities would not produce groundwater contaminants. All hazardous construction materials would be handled according to the packaging instructions and would undergo disposal in accordance with the existing UAF Hazardous Materials Management Plan. Any spills of hazardous materials would be contained and cleaned up in accordance with the UAF's Hazardous Waste Emergency Contingency Plan.

Construction of the proposed facilities would involve areas that are predominantly used for vehicle parking and surfaced with coal ash and gravel. Conventionally acceptable best management practices, such as the use of dikes, silt fencing, hay bales, etc., would be used to control any potential impacts due to erosion or stormwater runoff on surface water.

Under the current EPA regulations, a stormwater permit is not required for a "heat capture co-generation" station (Ref. 12).

Operation Impacts

The UAF well system network has the capacity to supply 400 gallons per minute (gpm) of treated water and is currently producing 180 gpm. Operation of the proposed project would increase the groundwater consumption rate by 25 gpm, for a total operating rate of 205 gpm. The UAF Utilities Department indicated that the increase could be readily accommodated.

The proposed coal fuel pipelines would be contained within existing underground, lined utilidors to minimize the risk of groundwater contamination. Stormwater runoff and spill controls would be implemented during operation activities. Dikes would be built around the diesel slurry and CWF storage tanks, the aqueous ammonia storage tank, and the sodium bicarbonate storage hopper. The dikes would be built to contain the contents of the largest tank plus a six-inch freeboard to allow for precipitation. The tanks would be designed to comply with all applicable regulations.

The UAF's Powerplant Spill Prevention Control and Countermeasures (SPCC) Plan, Hazardous Materials Management Plan, and Emergency Contingency Plan would be revised to include the new storage tanks and the proper handling of the hazardous materials. There are no known inherent hazardous characteristics for the CWF and the diesel slurry.

4.6 Wastewater

4.6.1 Affected Environment

The UAF wastewater is collected on campus and discharged to the City of Fairbanks sewer system at one discharge location. The current discharge is approximately 265,000 gallons per day (gpd), of which the power plant contributes an estimated 5,000 gpd. Because the discharge consists primarily of sanitary wastewater and non-contact cooling water, a permit from the Municipal Utility System (MUS) of the City of Fairbanks is not required.

The design capacity of the municipal waste water treatment plant is 8 million gallons per day (mgd), and the plant is currently operating at approximately at 6.5 mgd, or 75% of its capacity.

4.6.2 Environmental Consequences

Construction Impacts

The UAF requires contractors to supply their own portable toilets. Therefore, the construction workers would not contribute to the UAF's daily sanitary waste output.

Operation Impacts

Liquid waste containing concentrated minerals would be produced from boiler blowdown. This waste stream would be expected to have essentially the same composition as blowdown produced from the existing power plant. The boiler blowdown streams would be combined and discharged in accordance with UAF's existing agreement with the local sewer authority, the Municipal Utility System.

Wastewater from the proposed project would be tested prior to discharge. If uncontaminated, the water would be discharged, along with the wastewater currently generated from UAF activities, to the City of Fairbanks municipal wastewater treatment plant. If any wastewater generated by the proposed project were contaminated, it would be handled under the same procedures as contaminated laboratory wastewater, i.e., off-site disposal by a licensed contract hauler. The proposed project's discharges, along with all other UAF discharges, would be subject to the MUS's sewer ordinance.

A maximum wastewater volume of 3,000 gallons would be generated each time the coal cleaning process is shut down and flushed for maintenance. Wastewater generation would be intermittent, as often as once a week in the early period of operation, with decreasing frequency thereafter. The wastewater would contain suspended solids and trace organic compounds and would be collected in a holding tank for sampling and analysis. Much of this flush water would be recycled; the remainder would either be discharged to the sanitary sewer or, if necessary, removed by a licensed waste contractor. If the wastewater is discharged to the sanitary sewer, the occasional increased flow would have a minimal effect on the municipal treatment plant's excess capacity.

The four new workers required to operate the coal cleaning facility and CWF preparation system and the one new worker required at the power plant would increase the total volume of sanitary waste discharges, but the amount of increase would be minimal.

4.7 Soil

4.7.1 Affected Environment

All soils at both proposed project sites have been disturbed by campus activities. Soils at these sites are primarily comprised of coal ash and gravel, which were placed there during past activities.

4.7.2 Environmental Consequences

Construction Impacts

Construction activities, such as excavating for footings and grading of the proposed site, would disturb less than two acres of soil. Control measures, such as silt fences and hay bales, would be used to control erosion and sedimentation and minimize off-site tracking of the soils.

Operation Impacts

The soil at the proposed project site would not be disturbed during operation activities.

4.8 Noise

4.8.1 Affected Environment

The proposed project would be located near the existing power plant with its associated operational noise. Other sources of noise in the area are the airport, which is approximately 1.5 miles south of the campus, the railroad adjacent to the proposed site, and campus traffic.

In 1992, the UAF conducted a noise survey at the power plant. The results of the survey indicated that the noise levels were below the Occupational Safety and Health Administration (OSHA) 8-hour time weighted average of 85 A-weighted decibels (dBA) (see box), OSHA's threshold above which a hearing conservation program would be required. The following areas of the plant were found to have periodic sound levels that exceeded 80 dBA:

Common Noise Levels

The loudness of sound is measured in units of decibels (dB); loudness as heard by the human ear is measured on the A-weighted dB scale (dBA). An increase of one dB equals 30% more noise energy. A few examples comparing familiar noises and their exposure concerns are as follows:

Source*	dB	Concern
Soft Whisper	30	Normal safe levels.
Quiet Office	40	
Average Home	50	
Conservational Speech	66	
Busy Traffic	75	May affect hearing in some individuals depending on sensitivity, exposure length, etc.
Noisy Restaurant	80	
Average Factory	80 - 90	

Pneumatic Drill	100	Continued exposure to noise over 90 dB may eventually cause hearing impairment
Automobile Horn	120	
Jet Plane	140	Noises at or over 140 dB may cause pain
Gunshot Blast	140	

* Noise and You, Channing Bete Co., Inc., South Deerfield, MA, 1985.

- All levels of the main operating floors;
- Coal handling areas, when operational;
- Boiler #4 operating area, when the superheater vent is open; and
- Electric feed pump room, when the pumps are operating.

The power plant employees are instructed to wear proper hearing protection when they are in any of these areas (Ref. 1). The closest noise receptors are the campus student buildings located approximately 500 feet north of the proposed project sites. These are buildings with predominantly daytime activity. The predominant sources of noise that impact these locations are vehicular traffic, on-going campus and commercial activities, and regular air and train traffic.

4.8.2 Environmental Consequences

Construction Impacts

The proposed project's construction activities would occur in areas of existing 24-hour industrial-type activity currently exhibiting high noise levels; these activities would produce temporary noise disturbances associated with construction machinery and construction-induced traffic. Typical machinery would include earth movers, a small mobile crane, air compressors, etc. Typical noise levels for this type of construction equipment, with all pertinent equipment present at the site, range from 78 to 89 dBA at a distance of 50 ft from the source (Ref. 13). Noise decreases over distance. For a point source of noise, the sound level decreases by 6 decibels (dB) for every doubling of the distance from the source. At these levels persons outdoors within a 500-foot radius of the source, assuming no topographic attenuation, would experience noise in the range of 58 to 69 dB range. This is within the normally acceptable range of 62 to 74 dB for noise pollution (Ref. 14).

For persons indoors, these levels would be considerably attenuated depending upon the acoustical insulation properties of walls and windows. Construction sources of noise would be intermittent and temporary during land grading and structure assembly. All construction activities would be limited to normal working hours during the daytime, and work would be scheduled for Monday through Friday on day shifts only. The UAF has indicated that there is no history of noise complaints related to these types of activities.

Operation Impacts

Operation of the proposed diesel generator and ancillary equipment would exceed the noise levels that operation of the present power plant exhibited during the 1992 noise survey, which were below 85 dBA, unless additional attenuation measures, i.e., silencing, are instituted. The following would be the projected noise levels for the operation of the diesel generator (Ref. 15):

- Engine Mechanical Noise Inside Noise Attenuating Casing 104 dBA at 3 ft
- Engine Air Intake with Normal Silencer 105 dBA at 3 ft
- Engine Exhaust with Normal Silencer 100 dBA at 3 ft

The combined noise level of the three noise sources above would be approximately 108 dBA. At this level, persons outdoors within a 500-ft radius of the source (i.e., the closest noise receptors at the campus student buildings), assuming no topographic attenuation, would experience a noise level of approximately 64 dB. This level is within the normally acceptable range of 62 to 74 dB for noise pollution.

Any sustained noise level above 85 dbA experienced by employees would require implementation of an OSHA noise conservation program. A noise conservation program would be implemented through the Risk Management Department at the UAF, if necessary (Ref. 5).

The proposed coal cleaning operation with its ball mill and other grinding equipment would generate noise levels as high as 92 dBA within 6 feet of the equipment. Employees working with this equipment would be instructed to wear proper hearing protection. The wall separating the coal cleaning facility from laboratory and office space within the MIRL building is insulated and would attenuate the operational noise of the coal cleaning process to a level that would not be expected to disrupt office and laboratory routines.

4.9 Socioeconomic Resources

4.9.1 Affected Environment

The work force for the proposed project would be obtained from the local labor pools of Fairbanks (population 32,655) and the greater Northstar Borough (population 84,380), which includes Fairbanks. Building materials and supplies would also be obtained through the local economy.

4.9.2 Environmental Consequences

Construction Impacts

The peak work force during project construction would be 32 workers and would be expected to have a minimal effects on the local population, housing requirements, infrastructure, or economy. Construction materials would consist of common building supplies, such as concrete, structural steel, sheet metal, should be readily available in the Fairbanks area, and would be procured from local suppliers.

Operation Impacts

The peak work force for the operational phase of the proposed project would require 5 additional workers, four for operations at the MIRL and 1 for the power plant. This additional work force would also have negligible effects on the local population, housing requirements, infrastructure, or economy.

4.10 Worker Safety and Health

4.10.1 Affected Environment

The UAF Utilities Operations Department's worker compensation claims show that, over the past 10 years, forty-five worker safety and health mishaps have occurred. Prior to 1992, the OSHA recordable mishaps were predominantly safety/accidental related and involved coal handling activities. In 1992, the power plant stopped having coal delivered by rail car and no longer required manual unloading. Coal deliveries are currently deposited directly into the coal handling facility. The mishaps reported after 1992 vary in cause, but the majority involved being struck by an object and overuse, overextension, or twisting actions. Only one mishap was reported in 1996.

4.10.2 Environmental Consequences

Construction Impacts

The UAF has an established Worker Safety and Health Program and Plan, which covers construction and operating activities. Additional information specific to the proposed project concerning noise, chemical exposure, and physical handling and transfer of chemicals and equipment would be integrated into the existing program and plan. Proper worker training would take place prior to initiation of construction activities. In case of an accident, emergency procedures as outlined in the health and safety plan would be followed. Therefore, minimal impacts on worker safety and health would be expected.

Operation Impacts

Coal would continue to be delivered by truck and deposited by automated techniques directly into the coal handling facility. UAF employees would not handle any coal. Aqueous ammonia, sodium bicarbonate, and propane would be stored in above-ground storage tanks that would be designed to comply with all applicable regulations.

Health and safety practices for operation of the proposed new facilities would be integrated into the existing worker health and safety programs. Therefore, minimal impacts on worker safety and health would be expected.

There would be no risk of fire or explosion at the coal cleaning facility, since the pressurized heat treatment process would be performed under water.

4.11 Traffic and Transportation

4.11.1 Affected Environment

Current traffic and transportation around the proposed project site consist of power plant worker and coal and fuel oil delivery transportation activities. Each coal delivery consists of 50 tons using a tandem tractor trailer. Currently about 1,200 coal deliveries occur each year. Each fuel oil delivery consists of 9,600 gallons using a tandem tanker. Currently about 40 fuel oil deliveries occur each year.

4.11.2 Environmental Consequences

Construction Impacts

Transporting construction workers and equipment would slightly increase traffic in the vicinity of the proposed project. The increase would be only for a short term. Since the peak work force would be small (32 workers), a minimal impact on traffic patterns surrounding the proposed project site would be expected.

Operation Impacts

There would be decreases in coal use of approximately 41% and in fuel oil use by 28% when the proposed project is in operation as compared to the existing conditions at the UAF. Therefore, there would be an expected annual decrease in coal and fuel oil delivery traffic by approximately 500 trips for coal and 10 trips for fuel oil. Aqueous ammonia, sodium bicarbonate, and propane would be delivered by truck, with an expected average of one and a maximum of two deliveries per month for each. The proposed project would have a minimal impact on traffic patterns surrounding the proposed site.

4.12 Solid and Hazardous Waste Management

4.12.1 Affected Environment

Alaska officials consider coal ash to be inert and suitable for use as fill material. In the past, the UAF disposed of small amounts of coal ash on-site. The decision has been made that no new coal ash would undergo on-site disposal. An agreement between the UAF and the ADEC requires the UAF to develop a closure plan for past practices of on-site coal ash disposal.

The University has an OSHA training program and a Hazardous Material Handling Training Program in place. The SPCC Plan and the Hazardous Waste Emergency Contingency Plan have been prepared in accordance with the applicable state and federal requirements.

All hazardous waste in the State of Alaska must be hauled out of state for disposal, as there are no licensed treatment facilities within the state.

4.12.2 Environmental Consequences

Construction Impacts

During construction activities, no coal ash would be generated by the proposed project. Domestic waste would be collected in trash receptacles and disposed of according to UAF policy.

All personnel would be properly trained in OSHA practices and the proper procedures for handling hazardous materials prior to initiation of construction work activities. Most of the hazardous materials used for construction would be consumed. Any remaining hazardous materials from construction activities would be removed by a contractor according to applicable regulations.

Operation Impacts

Coal ash from the proposed project would be handled in the same manner as existing ash from the UAF power plant. Prior to placement as fill or disposal in a permitted landfill, representative samples would be analyzed using the Toxicity Characteristic Leaching Procedure to ensure that the waste is nonhazardous and meets the requirements of the Alaska Department of Environmental Conservation for disposal as fill material.

During operational activities, the total solid residuals would be less than 350 tons per year. These materials would primarily consist of coal ash, much of which would replace similar residuals currently produced at the power plant from combustion of coal and oil. If any hazardous wastes are generated, they would be removed by a licensed waste contractor under the UAF Risk Management Department Program.

4.13 Natural Disasters

4.13.1 Affected Environment

The two faults nearest the proposed project area are the Tintina Fault, approximately 50 miles north of Fairbanks, and the Hines Creek Strand of the Denali Fault, approximately 10 miles south of Fairbanks.

4.13.2 Environmental Consequences

Construction Impacts

During construction activities, no risk due to a natural disaster would be anticipated.

Operation Impacts

The proposed project structures would be designed to comply with the Alaska Zone 3 Seismic Area Uniform Building Code specifications. All structures would be built to withstand earthquake damage.

4.14 Pollution Prevention

Construction Impacts

Construction of the proposed facilities would be consistent with conventionally acceptable best management practices, such as the use of dikes, silt fencing, hay bales, etc., to control erosion and runoff.

Operation Impacts

The proposed project would utilize pollution control technologiesthat treat criteria pollutants to emission levels that are about one-half of the current New Source Performance Standards. Coal for the proposed project would be selectively obtained from the Usibelli mine to ensure a lower ash content than the coal typically shipped from the mine, thus reducing the amount of combustion ash that would otherwise be collected for disposal in the particulate control system for the coal-fired diesel. Much of the water produced from flushing of the coal cleaning process would be recycled.

Dikes would be built around chemical and product storage tanks to prevent any accidental spills from discharging to the surrounding environment. The SPCC Plan, Hazardous Materials Management Plan, and Emergency Contingency Plan would be revised to include the operation of the proposed project facilities.

4.15 Commitments of Resources

The irreversible and irretrievable commitments of resources for the proposed action are land use and the energy and materials that could not be reclaimed, reused, or recycled during construction and operation of the proposed project facilities. For coal processing and CWF preparation, less than 2 acres of land would be required for process equipment, coal storage, and CWF storage. Less than 1 acre of land would be required for the coal diesel generator power plant. During the three-year demonstration period, coal and diesel oil would be consumed, and ammonia, sodium bicarbonate, and propane would be used for the pollution control equipment.

However, as noted previously in Table 2, the consumption of coal and oil would decrease under the proposed action. Ammonia and sodium bicarbonate are both commonly used, abundant chemicals. Neither the use of these resources nor the land area for the proposed project represent a short-term use of resources that would compromise long-term environmental productivity. Since the proposed action would serve to demonstrate a clean coal technology with the intent of fostering its wider use, the short-term local use of resources could result in a long-term decrease of fossil fuel consumption and air quality degradation in other areas adopting this technology in the future.

4.16 Long-Term and Cumulative Impacts

Cumulative impacts are additive effects on the same or related resources from multiple actions or causes. No adverse cumulative effects on any resource could be identified for this proposed project.

The coal processing facility would be expected to continue in operation following completion of the 3-year demonstration project to provide fuel for the UAF power plant. The coal-fired diesel generator would be designed as a commercially viable plant capable of providing electric power for over 20 years.

4.17 Environmental Justice

Environmental Justice, as described in Executive Order 12898, means the fair treatment and meaningful involvement of all people, regardless of race, ethnicity, culture, income, or education level, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. In order to make all pertinent information about this proposed project available to the public and to assess any environmental justice concerns, DOE has conducted internal scoping and implemented a public participation effort.

The proposed project would take place in a developed commercial area with no low income or minority communities. No disproportionately high or adverse impact on minority or low-income communities would be expected from the proposed project.

4.18 Regulatory Compliance

The UAF has met with ADEC officials, and at this time no additional permits are required. The proposed action would be constructed and operated in compliance with all applicable federal, state, and local environmental regulations and licenses.

5.0 ENVIRONMENTAL CONSEQUENCES OF THE NO-ACTION ALTERNATIVE

Under the no-action alternative, DOE would not authorize the funding for ADL and its team to construct and operate the proposed project facilities. However, the UAF intends to purchase and install some type of oil-fired diesel generator for the UAF's black start capability and future power needs. Therefore, the no-action alternative would consist of adding an oil-fired diesel generator to the UAF power plant.

5.1 Construction Impacts

Under the no-action alternative, the proposed coal cleaning facility would not be constructed, and its construction impacts as described in Section 4.0 would not occur. The construction impacts of an oil-fired diesel generator would be similar to those of the proposed coal-fired diesel generator, as described in Section 4.0.

5.2 Operation Impacts

Under the no-action alternative, the operational impacts of the proposed coal cleaning facility, as described in Section 4.0, would not occur. The operational impacts of an oil-fired diesel generator would be similar to those of the proposed coal-fired diesel generator for all of the resources considered in Section 4.0, except for air quality, solid waste, and traffic and transportation.

5.2.1 Air Quality

The So_2 emissions would decrease from the current levels by about 67 tons per year; NOx would increase by 18 tons; PM_{10} would decrease by 0.4 tons; and CO would increase by 13 tons. However, all of the projected emission levels would be within the UAF's State Air Quality Permit limits.

5.2.2 Solid Waste

Solid waste generation and disposal practices would be the same as current conditions.

5.2.3 Traffic and Transportation

Coal delivery would remain at the current level, and fuel oil delivery would increase from the current level by approximately 3 trips per year.

6.0 RELATIONSHIP OF THE PROPOSED ACTION TO OTHER ACTIONS AND ACTIONS AND ACTIONS BEING CONSIDERED UNDER OTHER NATIONAL ENVIRONMENTAL POLICY ACT REVIEWS

The proposed action is not related to other actions currently in process or actions being considered under other NEPA reviews.

7.0 RELATIONSHIP OF THE PROPOSED ACTION TO ANY APPLICABLE FEDERAL, STATE, REGIONAL, OR LOCAL LAND USE PLANS AND POLICIES LIKELY TO BE AFFECTED

The proposed diesel engine and the coal cleaning facilities would be contained on UAF property and would fit the UAF's Master Plan. UAF's activities are consistent with applicable federal, state, and local land use plans and policies.

8.0 REFERENCES

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10. Letter from Judith E. Bittner, State Historic Preservation Officer, to Lloyd Lorenzi, 11 October 1996.
11. Federal Register, Volume 60, Number 189, Pages 51197 to 51203, 29 September 1995.
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13. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, U.S. Environmental Protection Agency, 31 December 1971.
14. Fax from John M. Horne, Manager, Nuclear and Analytical Engineering, Cooper Energy Services, to Mangi Environmental Group, Inc., 12 December 1996.

9.0 PERSONS AND AGENCIES CONTACTED

- Joe Adams, Director, Risk Management Department, University of Alaska at Fairbanks
- Charles Benson, Director Combustion Technology, Arthur D. Little, Inc.
- Judith E. Bittner, State Historic Preservation Officer, Alaska Department of Natural Resources, Office of History and Archaeology
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- George Burgess, Deputy Director, Planning and Project Services, University of Alaska at Fairbanks
- Karen L. Cedzo, Associate Vice Chancellor, University of Alaska, Fairbanks
- Charles B. Cooper, Environmental Permitting and Planning, Arthur D. Little, Inc.
- Jack Coutts, Environmental Engineer, Air Quality Operating Permits, Alaska Department of Environmental Conservation
- John M. Horne, Manager Nuclear and Analytical Engineering, Cooper Energy Services

- Kris McCumby, Northern Solid Waste Program Coordinator, Alaska Department of Environmental Conservation
- Al Ott, Alaska Department of Fish and Game, Habitat and Restoration Division
- Charles Ward, Mechanical Engineer, Utilities Operation, University of Alaska at Fairbanks
- Warrack Wilson, Technical Director, Coal-Water Fuel Services, Fairbanks, Alaska

[1]Several oxides of nitrogen are collectively referred to as NOx.
(2)Several oxides of sulfur are collectively referred to as SOx.

APPENDIX D

ACRONYMS

ADEC Alaska Department of Environmental Conservation

ADL Arthur D. Little, Inc.

AQCR Air Quality Control Region

CCT Clean Coal Technology

CFR Code of Federal Regulations

CO Carbon Monoxide

CWF Coal-water fuel

dB decibel

dBA A-weighted decibel scale

DOE Department of Energy

EA Environmental Assessment

ft Feet

gpd Gallons per day

gpm Gallons per minute

H2S Hydrogen Sulfide

hr Hour

lbs/hr Pounds per hour

mgd Million gallons per day

MIRL Mineral Industry Research Laboratory

MUS Municipal Utility System

Mw Megawatt

NAAQS National Ambient Air Quality Standards

NEPA National Environmental Policy Act

NOx Nitrogen Oxides

OSHA Occupational Safety and Health Administration

PM$_{10}$ Particulate matter less than 10 microns in diameter

ppm Parts per million

Ref. Reference

So$_2$ Sulfur Dioxide

SOx Sulfur Oxides

SPCC Spill Prevention Control and Countermeasures

tpy Tons per year

UAF University of Alaska, Fairbanks

Fg/m3 micrograms per cubic meter